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Dusting Cotton With Calcium Arsenate for Boll Weevil Control

(Progress Report)

By
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SUMMARY

The pre-square dust application just before the cotton begins to square is advisable, providing there are 20 or more weevils per acre.

The time to begin dusting cotton to protect the young squares is when the infestation reaches 10 per cent. Three dustings at intervals of four or five days is sufficient to reduce the infestation.

The average increase in yield from dusting on the Experiment Station at Auburn in 1924 was 204 pounds of seed cotton per acre. Weather conditions were favorable . The average increase in yield from dusting on the same plot in 1925 was 37 pounds of seed cotton per acre. The rainfall was below normal and the temperature was above normal.

In 1924 the yield of seed cotton per acre on the E. H. James farm was 85 pounds less on the dusted plot than on the undusted plot. A drouth in July caused the shedding of young bolls. There was an increase of 260 pounds of seed cotton per acre on the dusted plot in 1925.

The increase in yield on the dusted plot on the International Harvester Company farm in 1924 was 170 pounds of seed cotton per acre. The weather caused the shedding of bolls on these plots. The increase in yield on the dusted plot on the Joe Phillips farm in 1925 was 420 pounds of seed cotton per acre.

Thirty-six pounds of calcium arsenate will make six applications per acre.

The average cost of dusting was $7.25 per acre.

Boll weevils can be controlled economically only when the applications of dust are thorough and are applied at the proper time.

DUSTING COTTON WITH CALCIUM ARSENATE FOR BOLL WEEVIL CONTROL

(PROGRESS REPORT)

By

J. M. ROBINSON, Acting Entomologist*

During the growing season of 1924 and 1925 cotton dusting tests were made on three distinct types of soil, namely, Sandy Loam, Cecil Clay, and Houston Clay. Calcium arsenate in dust form and sweetened poison were used in 1924 for pre-square treatments to control the over-wintered weevils. The test plots were treated also with calcium arsenate and sweetened poison to control weevils at squaring time. However, the sweetened poison failed to keep the weevils under control so that it became necessary later to use calcium arsenate in dust form on the plots where sweetened poison was used.

The preliminary tests in 1924 with different methods and materials gave sufficient evidence to show the superior value of calcium arsenate in dust form over the sweetened poison in controlling boll weevils. Therefore, all tests were directed to the control of boll weevil with calcium arsenate dust during the 1925 growing season. The tests were made to learn when to apply calcium arsenate and how often to make applications of dust to control boll weevils economically under Alabama conditions.

The data given in this circular is for the plots that were treated for boll weevil control with calcium arsenate in dust form. The infestation records show a distinct reduction of weevil infestation following three applications of calcium arsenate in dust form at intervals of four or five days. In all cases the infestation dropped below 20 per cent and in some cases it went below 10 per cent.

This gave the conclusion that if the infestation is kept below 20 per cent while the middle and top crops are being set there will be a reasonable assurance of ample protection against weevil damage for the young squares and newly-set bolls. All of this is true provided there is sufficient fertilizer under the cotton to make a half bale or more per acre. It is advisable to make the pre-square application of calcium arsenate dust just before the cotton begins to square if there are 20 or more weevils per acre.

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Infestation

Three to six stakes, five feet long, were used to mark the stations in the field in keeping the infestation records. One hundred squares were counted around each stake. The number of punctured squares gave the percentage of infestation. When the infestation reached ten per cent three applications of calcium arsenate were made at intervals of four to five days. Four to six days after making the third application of calcium arsenate another infestation count was made. If the infestation approached twenty per cent other applications of dust were made.

Cost

The average cost per acre of cotton dusted on the tests was as follows: $2.00 for the dust gun, $4.20 for calcium arsenate, and $1.05 for seven hours of labor to apply the dust, making a total of $7.25 per acre. This was approximately the value of 100 pounds of seed cotton at the time of the tests.

The following pages contain a report of the experiments conducted during 1924 and 1925.

TESTS ON THE EXPERIMENT STATION, 1924

In the spring of 1924 the departments of agronomy and entomology began a series of cooperative boll weevil control tests with calcium arsenate, using various rates of the Auburn method of fertilizing.

Weather. —The rainfall for the growing season was above normal except for the month of July which was 3 inches, or 2.6 inches below normal. A total of 3.04 inches of rain fell by August 6th, the total for the month being 4.95 inches. A twenty-day period of clear weather, with daily maximum temperature ranging from 88 to 99 degrees Fahrenheit, was approximately ideal for squaring, blooming, and setting bolls.

Infestation. —The infestation of the dusted plots the 6th of August was 4.7 per cent as shown by Table II, page 6. On August 12 the infestation was 10 per cent. The cotton was dusted with calcium arsenate on August 12. Two other applications of dust were made at four-day intervals which resulted in keeping the infestation at 10 per cent. The infestation on the undusted plots August 25th had advanced to 61 per cent.

Picking Record. —The record indicated a definite control from dusting with calcium arsenate at four day-intervals. The proof was in the picking records, shown in Table III, page 6.

The final picking records for the 1924 cotton crop showed that where fertilizer was not used the yield was practically the same on the dusted and undusted cotton. With 500 pounds of ferti-

lizer per acre there was an increase of 222 pounds of seed cotton on the dusted plot over the undusted plot. There was a gain of 202 pounds of seed cotton on the dusted plot when the rate of fertilizer was 1500 pounds per acre. This is shown by figures 1 and 2, page 12. There was a gain of 98 pounds of seed cotton from dusting when the rate of fertilizing was 2000 pounds per acre. All of these plots were dusted at four-day intervals after the infestation reached 10 per cent until three applications had been made.

TESTS ON THE EXPERIMENT STATION, 1925

Weather. —The rainfall for the growing season of May, June, July, and August was 13 inches below normal. Cotton squares were limited throughout the season. The average maximum temperature for these months was 4.2 degrees above normal.

Infestation. —The infestation on the dusted plots was not above 10 per cent except in the plots where the fertilizer was applied at the rates of 1500 and 2000 pounds per acre. These facts are shown in Table III, page 6. On August 3 the general infestation on the dusted plots was eight per cent. The following day an application of calcium arsenate dust was made, and at four-day intervals thereafter until three applications had been made. The infestation was lowered from eight to two per cent. The infestation on the undusted plots advanced from 19 to 40 per cent during the same 12-day period.

Picking Record. —The light rainfall and high temperature controlled the weevils to such an extent that the difference between the dusted and undusted plots was within the experimental error, as shown by Table III, page 6.

The rainfall record for the two years at Auburn as compared with the normal rainfall is shown in Table I, which follows:

Table 1.—Normal Rainfall Record Compared with 1924 and 1925

Month	Normal	1924	1925
May	3.5	4.7	.71
June	4.2	6.6	.78
July	5.6	3.0	4.39
August	4.7	4.9	.01
September	3.1	4.7	5.10

This table shows that the rainfall during the growing season of 1924 was approximately normal. On the other hand, the rainfall for the growing season of 1925 was below normal.

Table II, which follows, is a record of infestation and dates of dusting cotton at Auburn:

Table II.—Infestation and Dusting Records at Auburn—1924 and 1925

1924				1925			
Average % Infestation			Dusting Dates	Average % Infestation			Dusting Dates
Date	Undusted	Dusted		Date	Undusted	Dusted	
Aug. 6 --	0.0	4.7		June 19 --	13.0	4.0	
Aug. 12 --	12.2	10.2	Aug. 12	June 23 --	13.0	1.5	
Aug. 16 --	25.7	43.5	Aug. 16	June 30 --	2.5	1.4	
Aug. 20 --	43.0	16.0	Aug. 21	July 4 --	3.2	0.4	
Aug. 25 --	61.1	10.7		July 8 --	3.4	0.0	
Aug. 28 --	74.0	58.5		July 11 --	5.2	0.0	
			Aug. 30	July 16 --	4.6	1.6	
			Sept. 3	July 23 --	8.2	4.8	
				July 28 --	4.5	3.8	
				Aug. 1 --	7.3	2.2	
				Aug. 3 --	19.8	8.8	Aug. 4
				Aug. 6 --	13.5	8.3	Aug. 7
				Aug. 11 --	40.5	2.5	Aug. 11
				Aug. 14 --	41.6	4.3	

The amount of fertilizer applied per acre and the yields of the dusted and undusted plots at Auburn in 1924 and in 1925 are shown in Table III, which follows:

Table III.—Record of Fertilizer and Yields at Auburn—1924 and 1925

Rate of Fertilizer	Pounds Seed Cotton per Acre			
	1924		1925	
Pounds per Acre	Undusted	Dusted	Undusted	Dusted
0 (Average of three plots -	107	101	285	251
500 ----------	456	678	509	535
1000 ----------	756	1050	695	770
1500 ----------	1148	1352	813	837
2000 ----------	1304	1402	899	887

TEST WITH B. H. SMITH, LEE COUNTY, 1924

In 1924 a test was conducted in cooperation with B. H. Smith, a farmer living in Auburn.

The soil in this test had been built up by crop rotation. Fertilizer was applied at the rate of 550 pounds per acre with 21 one-horse loads of stable manure added to each acre.

Infestation. —The infestation of the dusted plot reached 12 per cent on July 22, as shown by Table IV, page 7. An application of calcium arsenate dust was applied the following morning and at six-day intervals until three applications had been made. The infestation records indicated a control of boll weevils for that period. The squaring and blooming

records indicated that the maximum portion of the middle and top crop was set during the same period.

Picking Record. —There was a gain of 300 pounds of seed cotton per acre on the dusted plot over the undusted. This is shown in Table IV, which follows:

Table IV.—Infestation, Dusting, and Picking Records of B. H. Smith Test, in Auburn, 1924

Date	Average % Infestation		Dusting Dates
	Undusted	Dusted	
June 23	9	2	
June 28	7	3	
July 4	6	9	
July 10	4	5	
July 14	6	6	
July 19	7	13	
July 22	15	12	July 23
July 28	10	16	July 29
Aug. 1	17	5	Aug. 4
Aug. 9	23	10	
Aug. 14	56	43	Aug. 15
Aug. 20	89	58	Aug. 20
Seed Cotton per Acre	1620	1920	

TEST WITH E. H. JAMES, LEE COUNTY, 1924

Mr. James lives in Lee County five miles west of Loachapoka. The plots used were heavy red soil. The previous crop was weeds. The rate of home-mixed fertilizer was 500 pounds per acre.

Weather. —Favorable weather at planting time resulted in a good stand of cotton. Weather during the early part of the growing season was favorable for squaring. A few days of dry weather in late July caused heavy shedding of squares and small bolls.

Infestation. —The infestation on June 19, 1924, was 8 per cent on the undusted and 12 per cent on the dusted plot, as shown by Table V, page 8. The cotton was dusted first on June 19 and at intervals of four or five days until three applications had been made.

Fourteen days later there was a two-per cent infestation in the undusted plot and no infestation in the dusted plot. The infestation on the dusted plots did not reach 20 per cent at any future time. However, on July 18 the dusted plots did reach a 19-per cent infestation and a fourth application was made.

Picking Record. —The picking records showed 85 pounds more seed cotton per acre on the undusted than on the dusted plot. This is shown by Table V, page 8.

TEST ON E. H. JAMES' FARM, 1925

The plots on the Cecil Clay loam during the season of 1925 were located on the same farm with very similar soil conditions. The rate of home-mixed fertilizer was 300 pounds plus 9 loads of stable manure per acre.

There was only a fair stand of cotton due to a lack of moisture at the time of germination.

Infestation. —On June 27 the infestation on the dusted plot was 14 per cent, which is recorded in Table 5, page 8. Dust was applied at intervals of five and seven days, beginning July 1. By July 20 the infestation on the dusted plot had dropped to 6 per cent, as contrasted with a 17-per cent infestation on the undusted plot. A second group of dustings became necessary by July 20 when the infestation in the dusted plot advanced to 17 per cent. The dustings kept the infestation below 20 per cent until August 26.

The undusted plot advanced in infestation from 17 per cent on July 20, to 74 per cent on August 11. With squaring almost stopped, the weevils began making egg punctures in the young bolls. A sixth dusting was made August the 6th to protect the young bolls from weevil damage. The infestation records indicated a control of boll weevils from dusting.

Picking Record. —The picking records of the dusted plot showed an increase of 260 pounds of seed cotton over the undusted plot, which Table V, page 8, shows.

A record of the test in cooperation with E. H. James, a farmer living near Auburn, follows:

Table V.—Infestation, Dusting, and Picking Records of E. H. James Test, near Auburn, 1924

1924				1925			
Average % Infestation			Dusting Dates	Average % Infestation			Dusting Dates
Date	Undusted	Dusted		Date	Undusted	Dusted	
June 19	8	12	June 19	June 27	23	12	July 1
June 23	14	12	June 24	July 3	21	16	July 6
June 27	10	3	June 28	July 8	27	9	July 13
July 3	2	0	July 19	July 20	17	6	July 21
July 11	9	2		July 24	24	17	July 27
July 18	23	19		July 29	28	13	Aug. 6
July 24	21	4		Aug. 5	61	19	
July 31	11	2		Aug. 11	74	18	
				Aug. 18	58	20	
Seed Cotton Per Acre	755	670		Seed Cotton Per Acre	480	740	

TEST ON INTERNATIONAL HARVESTER COMPANY FARM

This farm is located in the Black Belt near Montgomery. Tests for boll weevil control with calcium arsenate dust were made on it in 1924 and in 1925.

The 1924 test plots were on Houston Clay soil that had not been cultivated in twenty years. Home-mixed fertilizer was applied at the rate of 510 pounds per acre.

The infestation (recorded in Table VI, page 10) reached 16 per cent July 21. Beginning July 22, three applications of calcium arsenate were made at four-day intervals. The infestation dropped from 16 to 7 per cent on the dusted plot, while the infestation on the undusted plots advanced to 20 per cent during the same period.

In every case where the applications of calcium arsenate in dust form were applied at intervals of four or five days the infestation was reduced to less than 10 per cent. A second series of three dustings was made to protect young bolls.

Picking Record.—The picking records disclosed a difference of 170 pounds in favor of the dusted plots. Table VI, page 10, is a record of this.

TEST ON JOE PHILLIPS' FARM

A test was made with Joe Phillips on Houston Clay soil in Montgomery County in 1925. These plots had been cultivated annually for many years.

Favorable weather resulted in a good stand and a good crop. Fertilizer was applied at the rate of 400 pounds of 8-4-4 per acre.

Infestation. —The infestation on June 17 (recorded in Table VI, page 10) was 31 per cent on the undusted plots and 27 per cent on the dusted plots.

The first application of poison was made on this date and at four-day intervals thereafter until three applications had been made. The infestation on the dusted plot dropped from 27 per cent to two per cent. On the undusted plot the infestation during the same period dropped from 21 per cent to 13 per cent.

Three extra dustings, beginning July 13, were applied at intervals of four or five days, keeping the infestation below 20 per cent. The infestation on the undusted plot remained above 20 per cent during the same period. On August 4 an application of calcium arsenate was made to protect the young bolls.

Control of weevils was conspicuous in these tests. The infestation records indicated a decided control.

Picking Record. —The yield of 670 pounds of seed cotton per acre on the undusted plot and 1090 pounds on the dusted plot (Fig. 3, page 11) was conclusive evidence that boll weevils were controlled profitably even under Black Belt conditions. It took approximately 100 pounds of seed cotton to cover the

expense of dusting so that this test showed a net gain of 320 pounds of seed cotton per acre for dusting.

In 1924 a test was made on the farm of the International Harvester Company, near Montgomery. In 1925 the test was on Joe Phillips' farm, near Montgomery, on the same type of soil. Table VI, which follows, is a record of these tests.

Table VI.—Infestation, Dusting, and Picking Record of Tests, near Montgomery, in 1924 and in 1925

1924				1925			
Average % Infestation			Dusting Dates	Average % Infestation			Dusting Dates
Date	Undusted	Dusted		Date	Undusted	Dusted	
July 1 --	6	2		June 17 --	21	27	June 17
July 8 --	3	2		June 20 --	16	18	June 20
July 15 --	3	6		June 24 --	12	11	June 24
July 21 --	16	16	July 22	June 29 --	13	2	
July 25 --	25	10	July 26	July 6 --	17	7	
July 29 --	20	7	July 30	July 13 --	23	20	July 13
Aug. 5 --	21	7	Aug. 12	July 18 --	20	17	July 18
Aug. 12 --	70	31	Aug. 19	July 22 --	23	15	July 22
Aug. 18 --	68	40	Aug. 30	July 27 --	29	8	
Aug. 25 --	67	8		Aug. 3 --	53	14	Aug. 4
Seed Cotton Per Acre	235	405		Seed Cotton Per Acre	670	1090	

Timeliness and Thoroughness

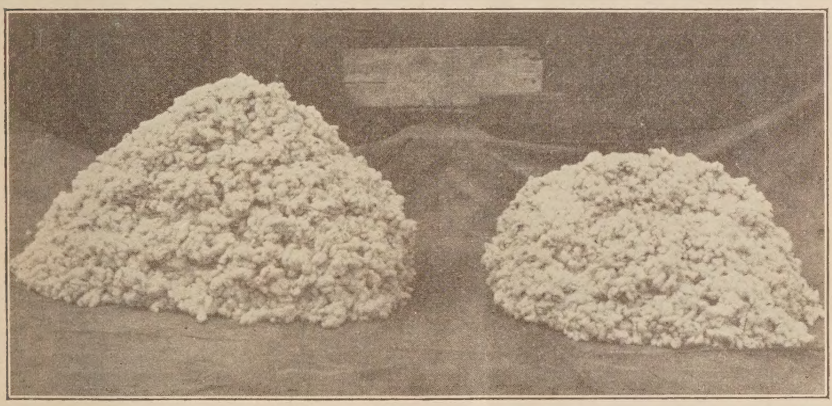
Cotton dusting should be done properly or it should not be done at all. Where poison is to be used to control boll weevils it is necessary to have enough dust for a season and the dusting machinery on hand before time to begin dusting. It is also essential that the per cent of infestation be determined at frequent intervals after squaring begins.

The infestation can be determined by counting all the squares on the plants, keeping a count of the punctured squares, until one hundred squares have been counted. The number of punctured squares will give the per cent of infestation. For example: if the number of punctured squares, at the first station, is eleven out of 100 squares counted, the infestation is 11 per cent. When the average infestation of all the stations is 10 per cent it is time to begin dusting. When many squares have fallen to the ground the infestation is much higher than 10 per cent. Unfortunately, many farmers have used fallen squares as a guide to indicate the percentage of infestation, which means that poison was applied too late for best results.

The dust should be applied with a dust gun. This may be a hand gun, a two-row machine, a three-row machine, or an airplane. Calcium arsenate will distribute over the cotton better when the air is still or nearly so. Therefore, early morning, late evening, or night are preferred for dusting.

If the foliage is moist, calcium arsenate will stick to the plants better. However, definite control has been obtained by dusting cotton when the plants were dry and the air quiet.

If the infestation does not reach 10 per cent there is little or no profit to be obtained from dusting. Making applications of calcium arsenate promptly and thoroughly when they are needed will assure a more economic control of boll weevils.



Dusted *Undusted*

Dusted—1050 Pounds Seed Cotton

Undusted—756 Pounds Seed Cotton